Analysis and Visualization of airbnb in Seattle

AirbnbViz Team:

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Background

- Airbnb is a web-based marketplace for people to list, discover, and book unique accommodations around the world.

- It has over 800,000 listings in more than 34,000 cities and 190 countries.

- Travelers can only find the prices and reviews when search for places on selected dates

- Hosts have no idea how other priced/rated around them.

Target Users & Objectives

- Travelers: search for and book accommodations
  - Can I visualize the location of all listings and its information instead of the listing available on selected dates?
  - Which neighborhood has higher/lower rating? what is the top rated/poor rated neighborhoods in Seattle?
  - Which neighborhood has higher/lower price? what is the most expensive/cheapest neighborhood in Seattle
  - Is my desired room type/amenities within my budget?

- Hosts: list and rent out their unused spaces
  - How other people priced around me, relative to dimensions such as amenities and location?
  - How other people rated around me, relative to dimensions such as amenities and location?

Data

- ## Seattle's Airbnb listing data from Inside Airbnb
  - http://insideairbnb.com

- ## NOAA Weather
  - http://www.noaa.gov

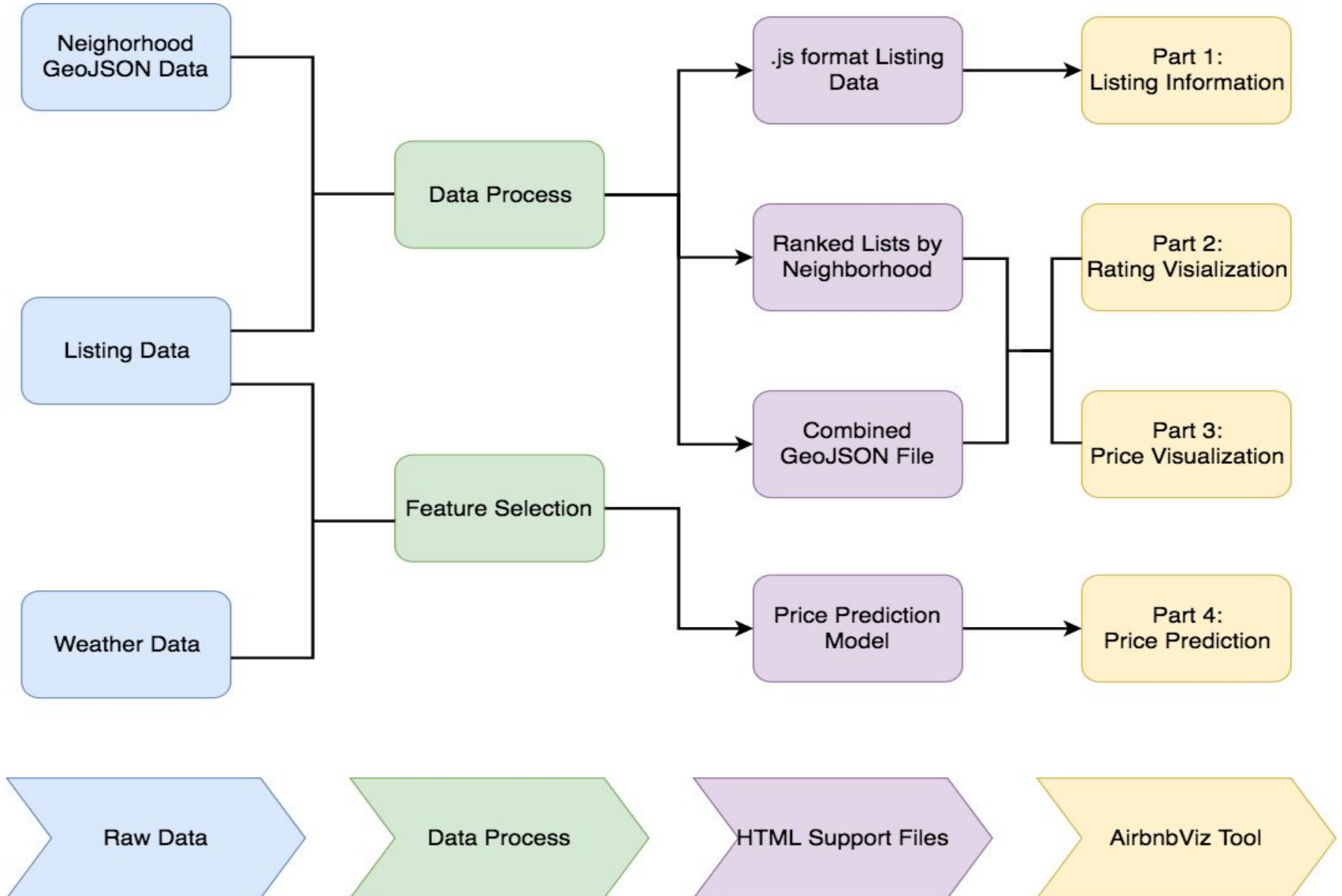- ## Seattle Neighborhoods GeoJSON Data

Use Cases

- Detailed information of all listings on map to get an overview of Seattle

- Mapping average rating data by neighborhood

- Mapping average rent price by neighborhood

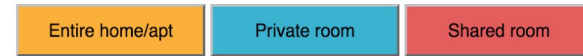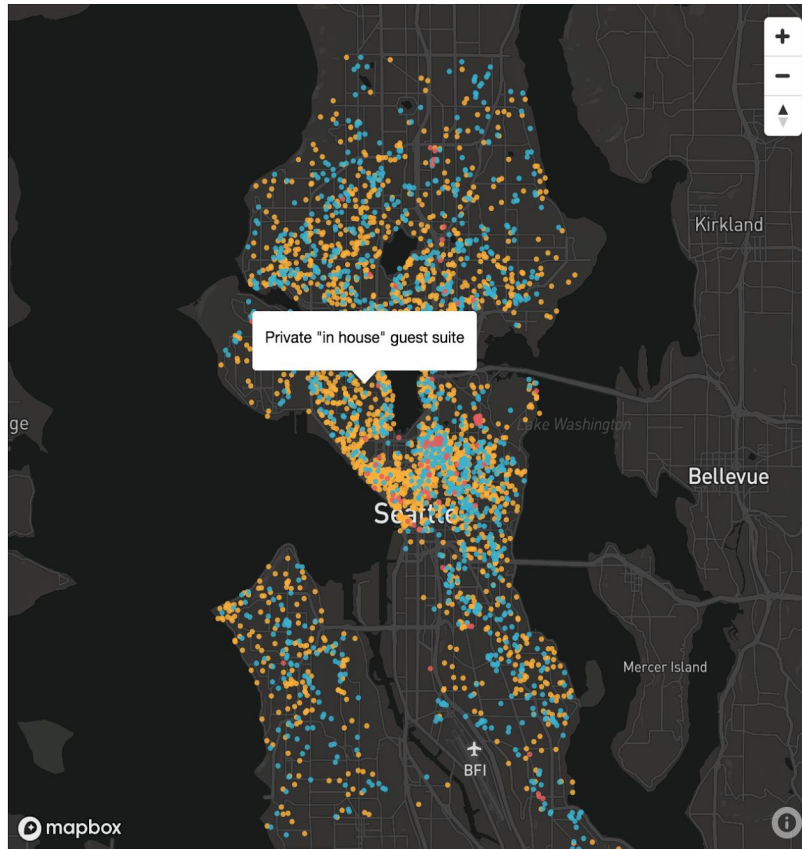- Get predicted rent price by entering desired housing features

System Design

Components of Use Case 1

Seattle Airbnb Visualization of Homes

Entire home/apt | Private room | Shared room

Detailed Information of Home
Home Name: Private "in house" guest suite
Home Address: Nob Hill Ave N, Seattle, WA 98109, United States
Neighbourhood: East Queen Anne
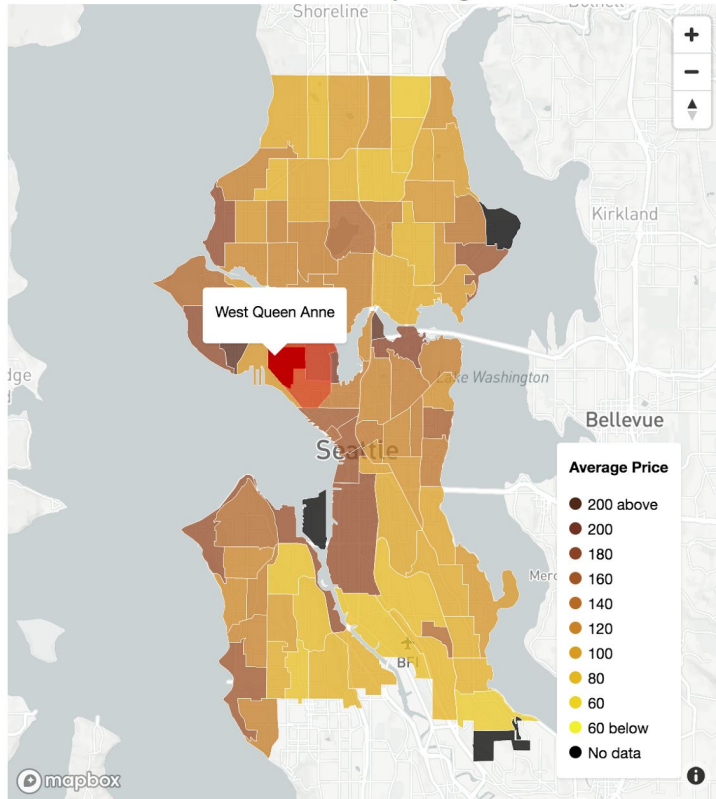**Room Type:** Entire home/apt
Daily Price: $142

- ○ Map view that allows users to visualize room type and home location
- ○ Buttons that allows users to select and hide specific room type
- ○ User interface that allows users to select any home and see its detailed listing information

Components of Use Case 2

Seattle Airbnb Visualization by Neighbourhoods : Average Price

- Map view shows average price of each neighbourhood
- User interface that allows users to select different neighborhood and see its detailed information eg. average rent price, neighborhood group it belongs to, neighborhood ranking,
- Ranking boards to show top five most expensive and cheapest neighborhood

Components of Use Case 3

Seattle Airbnb Visualization by Neighbourhoods: Average Rating

Detailed Information of Neighbourhood:

Neighbourhood Name: **Adams**
Neighbourhood Group: **Ballard**
Average Rating: **95.35087719298245**

Average Rating by Neighbourhood Group

Rank	Group	Rating
#1	Central Area	96.0
#2	West Seattle	95.9
#3	Delridge	95.9
#4	Ballard	95.5
#5	Queen Anne	95.4
#6	Seward Park	95.0
#7	Rainier Valley	94.7
#8	Northgate	94.7
#9	Lake City	94.4
#10	Capitol Hill	94.2
#11	Beacon Hill	94.0
#12	Downtown	94.0
#13	Magnolia	93.8
#14	Interbay	93.8
#15	Cascade	92.5
#16	University District	88.4

Top 5 *Best* Rating Neighbourhood

#1 Arbor Heights: 98.00

#2 Riverview: 97.25

#3 Southeast Magnolia: 97.21

#4 Madrona: 97.10

#5 Harrison/Denny-Blaine: 97.08

Top 5 *Worst* Rating Neighbourhood

#1 South Park: 88.00

#2 University District: 88.44

#3 Pinehurst: 89.25

#4 South Beacon Hill: 89.50

#5 View Ridge: 90.17

- Map view shows average rating of each neighbourhood
- User interface that allows users to select different neighborhood and see its detailed information eg. average rating, neighborhood group it belongs to, neighborhood ranking,
- Ranking boards to show top five best rating and worst rating neighborhood

Components of Use Case 4

Rent Price Prediction

Please input all paramaters, then click PREDICT.

Accommodates `1`

Number of Bedrooms `2`

Number of Bathrooms `1`

Neighborhood Group: `Ballard`

Property Type: `Apartment`

Room Type: `Entire home/apt`

PREDICT PRICE!

Your Suggested Price:

$146

- User interface that allows users to input the number of accomodates, bedrooms and bathrooms and select neighborhood, property type and room type
- User interface that displays the predicted rent price after users inputting housing features

Project Structure

```
analyze-of-seattle-airbnb-hosts (master)
|     .gitignore
|     License
|     README.md
|     setup.py
|     start.py
|
|----- Docs
|     |     Design Specification.md
|     |     Functional Specification.md
|     |     Logo.png
|----- AirbnbViz
|     |     __init__.py
|     |
|     |----- data
|     |     |     listings.csv
|     |     |     listings2.csv
|     |     |     listings_combined.csv
|     |     |     neighbourhoods.geojson
|     |     |
|     |----- examples
|     |     |     Price VS. Comments and Reviews.ipynb
|     |     |     Rating VS Comment's length.ipynb
|     |     |     create avg.js.ipynb
|     |     |     generate ranked price by neighbour group.ipynb
|     |     |     neighborhood data.ipynb
|     |     |     price predict model.ipynb
|     |     |
|     |----- code
|     |     |     generate_listings.py
|     |     |     generate_neighbourhoods.py
|     |     |     generate_ranked_data.py
|     |     |     price.py
|     |     |     probability.py
|     |     |
|     |----- tests
|     |     |     test_generate_listings.py
|     |     |     test_generate_neighbourhoods.py
|     |     |     test_generate_ranked_data.py
|     |     |
|     |----- home page
|     |     |     index.html
|     |     |
|     |----- html
|     |     |     home_view.html
|     |     |     price.html
|     |     |     rating.html
|     |     |     prediction.html
|     |     |
|     |     |----- js
|     |     |     |     ranked_price_data_by_group.js
|     |     |     |     ranked_rating_data_by_group.js
|     |     |     |     listings.js
|     |     |     |     neighbourhoods.js
|     |     |     |     neighbourhoods.json
|     |     |     |     predict_source.js
|     |     |     |     ranked_price.js
|     |     |     |     ranked_rating.js
```

https://github.com/wangbeiqi199159/AirbnbViz

Demo

Lesson Learned

- ## Bokeh
  - Under development and inflexible
  - Only support google API
  - Unfamiliar with how Bokeh generate HTML page

- ## Github
  - Collaboration workflow
  - Documentation

Future Work

- Update our tool to be used on a worldwide scale
- Build Airbnb Search Engine for travelers
- Build Maximum Airbnb Revenue for Host

Thank you

Questions?